heating the slab to a temperature not higher than 1,300°C, hot rolling the slab to a hot-rolled sheet, optionally annealing the hot-rolled sheet,

cold rolling the hot rolled sheet to a cold-rolled sheet by a reduction ratio of not less than 80% by using a one stage cold rolling or two or more stages of cold rolling with intermediate annealing,

decarburization annealing the cold-rolled sheet for decarburization of the sheet at a temperature of 700 - 1,000°C,

treating the cold-rolled sheet for nitriding by using NH_3 gas, and final annealing,

wherein the improvement comprising the sheet has a final thickness of 0.36 - 1.00 mm,

setting C-content to not greater than 0.0050% by weight after decarburization annealing of the sheet,

setting total N-content to 0.010 - 0.027% by weight after nitriding treatment of the sheet in NH_3 gas following said decarburization annealing,

coating the nitrided sheet with an annealing separation agent consisting essentially of MgO and subjecting the coated sheet to final annealing as a coil having a coil inside diameter within a range of 200 - 1500 mm to obtain grains of a selected diameter, its grains of a diameter exceeding 5 mm having a crystal orientation

deviation of 0.2 - 4 degrees in relation to that at the grain center, and a post-final-annealing SF value of less 0.80, where SF is defined as

$$SF = (\text{grain area} \times 4\pi)/(\text{grain boundary length})^2,$$

whereby a magnetic flux density B_8 of the sheet is not less than 1.83T and core loss $W_{17/50}$ (w/kg) of the sheet is not more than 3.3 x t + 0.35.--